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Original Research Article

Incidence of Post-Operative Serum Calcium Level in Thyroid Surgery, A Prospective Study in a Tertiary Health Care Hospital

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Conflict of interest: Nil

Abstract:

Objective: This study aimed to evaluate the incidence of hypocalcemia following near-total and total thyroidectomy over a 2-year period from November 2022 to November 2024.

Material and Method: A total of 120 patients above 12 years undergoing thyroidectomy were included. Pre-operative assessments, including clinical history, examination, fine needle aspiration cytology, thyroid function tests, ultrasound neck, and indirect laryngoscopy, were conducted. Blood samples were collected pre-operatively and postoperatively. Hypocalcemia was defined as serum calcium below 8 mg/dL and ionized calcium below 4.4 mg/dL, with transient hypocalcemia lasting less than 6 months and permanent hypocalcemia persisting beyond 6 months. Biochemical and laboratory tests, including thyroid function tests, were performed, and management involved calcium supplementation with or without vitamin D.

Results: The study revealed an overall incidence of hypocalcemia at 21.6%, with 7.5% progressing to permanent hypocalcemia. Malignancy was more prevalent in males (60%), while benign disorders were common in females (60% in the age group 20-50 years).

Conclusion: Postoperative hypocalcemia, though a frequent complication after near-total and total thyroidectomy, can be mitigated through proper planning, meticulous surgical techniques, and the use of advanced technologies. Regular monitoring and early intervention are imperative for patient well-being, emphasizing the importance of attention to surgical details in minimizing complications.

Keywords: Near-Total Thyroidectomy, Total Thyroidectomy, Transient Hypocalcemia, Permanent Hypocalcemia.

Introduction

Permanent or temporary hypoparathyroidism is a well-known complication of total thyroidectomy [1,2] . Excision of parathyroid glands and vascular insufficiency are the main causes of this complication [3,4,5] .Identification of the parathyroid glands and meticulous surgical technique to preserve parathyroid circulation are essential during near total/ total thyroidectomy [6,7] .

Aim and Objective:

This study aims to evaluate the incidence of hypocalcemia (both transient and permanent) following near-total thyroidectomy and total Thyroidectomy. This study will include the following:

1. Incidence of hypocalcemia following Total and Near-Total Thyroidectomy.
2. Follow up of patient's upto a period of 6 months.

Material and Method:

Source of Data: S.C.B. Medical College and Hospital, Cuttack, Odisha.

Study Design: Prospective Case Series Study.

Study Period: November 2022 to November 2024.

Sample Size: N=120.

Inclusion Criteria:

1. Patients who give written informed consent after reviewing the informed consent document.
2. Patients undergoing total thyroidectomy above 12 years.

Exclusion Criteria: Patients with contra-indications for surgery and general anaesthesia and those who were not in a euthyroid state.

Methodology:

Patients in this study underwent pre-operative assessment to confirm the diagnosis which included

1. Full clinical History.
2. Clinical examination.
3. Fine Needle Aspiration Cytology.
4. Thyroid function test (TFT).
5. Ultrasound Neck.
6. Indirect laryngoscopy to assess vocal cord status.

After the initial assessment and planning for surgery, blood was collected in a plain sampling bottle pre-operatively for serum total calcium and ionized calcium levels. Another sample of blood was collected between 24 to 48 hours post-operatively and submitted to the same to lab. If Signs and symptoms of hypocalcemia presents early estimation of serum and ionized calcium done at regular intervals. After discharge patients were followed up for duration of 6 months with estimation of serum and ionized calcium done. Hypocalcemia for the study was defined as serum calcium level below 8 mg/dl and ionized calcium below 4.4mg/dl. Transient hypocalcemia was defined as serum calcium level below 8 mg/dl for a period of less than 6 months and Permanent hypocalcemia for more than 6 months. All the patients included in this study were subjected to biochemical and laboratory tests like routine hematological investigations, blood sugar, serum electrolytes, renal function test, and liver function tests. Additional tests like the Thyroid function test were conducted which included serum TSH, serum-free T3 and T4. Management of hypocalcemia was done using oral or intravenous calcium supplementation with or without vitamin D and assessing the outcome of medical management of hypocalcemia. When the disorder affects both lobes, total or near-total thyroidectomy is mandatory, especially in younger persons, to obviate suppressive therapy and possible relapse. Ambrosi et al found that recurrence was inversely related to the extent of resection. An advantage of near-total thyroidectomy over subtotal thyroidectomy is that the thyroid remnant of about 2 g renders it accessible to I-131ablation if cancer is found in the specimen and obviates reoperation for completion thyroidectomy.

Permanent or temporary hypoparathyroidism is a well-known complication of total thyroidectomy. Excision of parathyroid glands and vascular insufficiency are the main causes of this complication. Identification of the parathyroid glands and meticulous surgical technique to preserve parathyroid circulation are essential during near total thyroidectomy which were done by consultants or under their guidance in my study. So currently in our department we prefer to use near-total thyroidectomy over total thyroidectomy for the treatment of benign enlargement of both lobes of the thyroid.

Statistical Analysis: Data was analyzed using descriptive and inferential statistics. Chi-square test for categorical data, unpaired student's t-test for continuous data. P-value < 0.05 is considered statistically significant. Statistical package SPSS-20 was used for analysis.

Results:

Table 1: Age distribution in the study.

Age in years	Colloid Goitre	MNG	Toxic Goitre	Thyroid Carcinoma
10-20	3	3	0	0
21-30	0	14	1	5
31-40	2	20	6	7
41-50	1	22	4	6
>50	1	13	4	8

Table 2: Sex distribution in the study.

Sex	Colloid Goitre	MNG	Toxic Goitre	Thyroid Carcinoma
Male	3	1	3	16
Female	66	7	13	11

Table 3: Distribution of hypocalcemia among age groups of patients in the study.

Hypocalcemia		
Age in years	**Transient**	**Permanent**
10-20	1	1
21-30	3	0
31-40	2	2
41-50	5	1
>50	15	5
TOTAL	26	9

Table 4: Distribution of hypocalcemia in the study among the diagnosis & procedure performed.

Hypocalcemia		
	Transient	**Permanent**
Diagnosis		
MNG	8	1
Colloid Goitre	1	0
Toxic Goitre	2	2
Thyroid Carcinoma	15	6
Procedure		
Near-total thyroidectomy	11	2
Total thyroidectomy	6	2
Total thyroidectomy	9	5
TOTAL	26	9

Table 5: Distribution of signs and symptoms of 9 symptomatic patients

Signs and Symptoms	**No. of Cases**
Chvostek	3
Parasthesia and Numbness	5
Trousseau	3
Myalgias	5
Facial spasms	4
Carpal spasms	2
Pedal spasms	1

Total patients with hypocalcemia, n=26, Symptomatic patients=9 (34%)

Discussion

In our study which is a prospective type, 120 patients were included over a period of 2 years from November 2022 to November 2024. Regarding the sex distribution in this study, as per Table-II, there were 23 males (19.2%) and 97 females (80.9%), thus we can infer that thyroid disorders are overwhelmingly more common in the fairer sex. But malignancy of the thyroid gland was more common in male gender (60% of cases), probably male gender being in a greater risk for malignancy as per the AGES/AMES criteria for thyroid malignancies [8]. But the benign disorders of the thyroid were more common among females in age group of 20-50 years (60%) as per Table-I [9].

Malignant disorders of thyroid were more common after 50 years of age. The incidence of hypocalcemia in our study was 26 cases out of 120 operated (21.6%).

Out of the 26 cases that developed hypocalcemia in our study 9 patients(34.6%) went in for permanent hypocalcemia or hypoparathyroidism which is defined as hypocalcemia persisting after 6 months of surgery [10] , i.e. 35% of 72 patients with transient hypocalcemia went in for permanent hypoparathyroidism requiring lifelong calcium and/or vitamin D3 supplementation. So the incidence of permanent hypocalcemia in our study is 7.5%.

Conclusion

Postoperative hypocalcemia is the most common and sometimes the most severe and potentially debilitating complication observed after Near-total thyroidectomy and Total thyroidectomy. The incidence of hypocalcemia (transient) in our study is 21.6% and permanent hypocalcemia requiring lifelong calcium and/or vitamin D3 supplementation is 7.5%.So proper planning and meticulous surgical technique with special emphasis in localization and preserving the vascularity of at least one parathyroid gland will go a long way in reducing this complication.

We should employ newer techniques like auto-transplantation of parathyroids, use of Ultrasonic shears and enhanced bipolar diathermy which may help in bringing down the incidence of post-operative hypocalcemia. Proper post-operative monitoring and early detection by performing a serum calcium assay and even an intact-Ipth assay (if available and affordable) are mandatory to prevent post-operative distress to patients. Adequate and timely calcium and /or vitamin D3 supplementation is advised in patients at risk for developing post-operative hypocalcemia and for the treatment of all symptomatic patients.

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